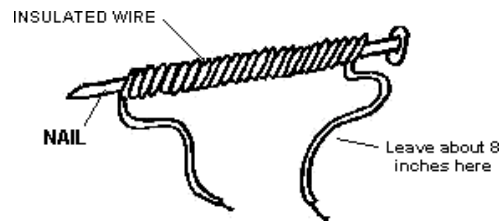


Electromagnet Strength

Objective:

Determine how an electromagnet's strength depends on the current through the electromagnet and the number of turns of wire



Materials:

variable dc power supply, ammeter, electromagnets (wire and nails), force scale

Procedure:

1. Construct a series circuit with an electromagnet, variable dc power supply, and ammeter.
2. Record the number of turns of wire of this electromagnet in **Data Table I**.
3. Adjust the power supply until the current through the ammeter is the first value shown in **Data Table I**.
4. Place the hook end of the force scale to the electromagnet and slowly pull until they come apart. Do this several times and record the largest force value as the strength of the electromagnet.
5. Increase the current and continue this procedure until the data table is complete.
6. Make a graph of "**Electromagnet Strength vs Current**."
7. Describe the shape of this graph. Obtain its best fit equation, if possible.

Data Table I

| # Turns of Wire | Current, Amps | Strength, N |
|-----------------|---------------|-------------|
| | 0 | 0 |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |

8. Now use a fixed current and vary the number of turns of wire to see how the number of turns of wire affects the strength of the electromagnet.

9. Set up your circuit as before, but this time use a different electromagnet while keeping a constant current in each trial.
10. Complete **Data Table II**.

Data Table II

| Current, Amps | # Turns of Wire | Strength, N |
|------------------|-----------------|----------------|
| 0 | | 0 |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |

11. Make a graph of “**Electromagnetic Strength vs Number of Turns of Wire.**”
12. Describe the shape of this graph. Obtain its best fit equation, if possible.

